Reports of voluntary observers—Continued.

Voluntary observers.	Time—90th meridian.
Indiana—Cont'd.	
Columbus	5.05.
Connorsville	5.10.
Delphi	5.15.
Edwardsville	Shortly after 5.00.
Evansville	5.09.
Farmland	5.15.
Huntingbury	5.15 heavy.
Huntington	About 5.00.
Jasper	About 5.18.
Jeffersonville	5.28.
Kokomo	5.10.
Lafayette	5.12 to 5.15.
Logansport	5.15.
Lyford	About 5.00.
Madison	At 5.06.
Marion	5.10.
Mount Vernon	5.15, severe.
Princeton	5.15, severe.
Rockville	5.15.
Scottsburg	About 5.00.
Seymour	5.10.
South Bend	Few min. after 5.00.
Syracuse	5.10.
Terre Haute	5.18.
Topeka	5.00.
Valparaiso	About 5.15.
Vevay	5.10, strong.
Iowa.	
Ames	5.20.
Cedar Rapids	Little past 5.00.*
Charlton	5.10.
Dubuque	5.15.
Fairfield	5.00.
Fort Madison	Few min. past 5.00.
Glenwood	About 5.00.
Grinnel	5.20.
Iowa City	5.07.
Marshalltown	About 5.00.
Moran	4.50.
Mechanicsville	5.12.
Mooar	5.05.
Mount Pleasant	5.16.
Mount Vernon	5.13.
Ottumwa	5.05.
Sydney	5.10.
Winterset	5.30.
Kansas.	
Blaine	5.15 to 5.17.
Frankfort	5.10.
Manhattan	5.15.
Wamego	5.15.
Kentucky.	
Alpha	5.10, violent.
Blandville	About 5.15, very severe.
Bowling Green	Few min. after 5.00.
Canton	5.15.
Earlington	5.10.
Edmonton	5.30.
Falmouth	5.15.
Fords Ferry	5.45, (sun time.)
Franklin	5.09.
Henderson	5.12, very severe.
Paducah	5.12.
Pleasure Ridge P'k.	$5^h\ 8^m\ 45^s$.
Princeton	5.08.
Michigan.	
Battle Creek	5.15.
Berrien Springs	4.00 or 5.00.
Grand Rapids	About 5.00.
Hanover	About 5.00.
Kalamazoo	5.10.
South Haven	5.00.
Mississippi.	
Aberdeen	About 5.00.
Austin	5.00.
French Camp	About 5.00.
Fulton	5.00.
Hernando	About 5.00.
Holly Springs	5.15, heavy.
Louisville	About 5.00.
Mayersville	4.45.
Pontotoc	5.00.
Water Valley	5.02.
Missouri.	
Birch Tree	5.10.
Bluffton	5.05.
Edgehill	5.25.
Eight Mile	5.30.

Voluntary observers.	Time—90th meridian.
Missouri—Cont'd.	
Fayette	5.15.
Fulton	5.00.
Gayoso	About 5.00.
Glasgow	5.13.†
Gordonsville	5.15.
Half Way	4.00.
Hermann	5.12.
Houston	About 5.20.
Houstonia	5.12—5.15.
Ironton	5.15.
Kidder	5.10.
Lamonte	5.15.
Lebanon	5.15.
Lexington	5.14.
Liberty	Few min. before 5.14
McCune Station	5.12.
Marcelline	5.00.
Maryville	5.15.
Mexico	5.10.
Mine La Motte	5.05.
New Haven	5.15.
New Madrid	5.14, heaviest since 1811.
New Palestine	About 5.00.
Oakfield	5.15.
Oak Ridge	4.00.
Oregon	5.00.
Do	5.15.
Palmyra	5.15.
Poplar Bluff	5.10.
Potosi	5.10.
St. Charles	5.14.
Shelbina	5.15.
Sikeston	5.05.
Steffenville	5.10.
Trenton	5.10 to 5.15.
Unionville	5.10 to 5.13.
Vermont	5.10.
Vilas	5.20.
Virgil City	About 5.00.
Warrensburg	3.00 and 5.00.
Warrenton	5.08 to 5.09.
Willow Springs	5.00.
Zeitonia	5.00.
Nebraska	
Burchard	5.07.
North Carolina.	
Lenoir	About 5.00.
Skyuka	Between 5.00 & 6.00.
Waynesville	About 5.10.
Ohio.	
Bellefontaine	About 5.15.
Camp Dennison	5.10.
Cleveland	About 5.15.
Dupont	5.15.
Fayetteville	5.00.
Greenville	Between 4.00 & 5.00.
Hanging Rock	5.15.
Hillsboro	Little aft. 5.00.
Leipsic	5.26.
McConnellsville	5.00.
Montpelier	About 5.12.
New Bremen	5.30.
New Paris	5.00.
Ottawa	5.20.
Portsmouth	5.12.
Vanceburg	5.15.
Van Wert	5.05.
Waverly	5.12.
Oklahoma.	
Pond Creek	In the a. m., slight.
Tennessee.	
Ashwood	5.20.
Bolivar	5.15.
Covington	About 5.00.
Dyersburg	5.08.
Franklin	5.15.
Hohenwald	About 5.00.
McKenzie	5.10.
McMinnville	5.11.
Milan	5.09 to 5.10.
Mount Carmel	About 5.00.
Palmetto	4.00.
Riddleton	Between 4.00 & 5.00.
Sewanee	About 4.00.
Trenton	5.15.
Wisconsin.	
De Pere	5.15.

*As recorded on the thermograph sheet. †The Observer, C. W. Pritchett, is director of the Morrison Observatory at Glasgow.

PHOTOGRAPHING LIGHTNING BY DAYLIGHT.

By A. J. HENRY Chief of Division of Records and Meteorological Data (dated January, 1896).

It is a common observation by those who have closely watched lightning flashes of the linear zigzag type that the flash sometimes appears to repeat itself in substantially the same path, or to pour forth a continuous stream from cloud to earth for an appreciable time. As long ago as 1835 Dove satisfied himself that single flashes of lightning often consisted of a number of apparently instantaneous discharges. Frequent attempts have been made, principally by Prof. Rood, by the aid of a revolving disk with colored or numbered sectors, to determine the duration of flashes of the several types. The duration of the complete act has been found to vary from less than $\frac{1}{1000}$ of a second to a whole second, although the individual flashes occupy but a few thousandths of a second.

Photographs of lightning flashes have been made by many persons during the night time, but, so far as known, a flash has never been photographed during daylight hours. Considering that flashes of the multiple-discharge character continue for an appreciable time, it has often occurred to me that under favorable conditions it would be possible to make a negative of a flash of this character.

On September 19, 1895, the conditions long looked for occurred. The heavens were completely overcast, and although it was about 2 o'clock in the afternoon, the actinic power of the light was so reduced that it was possible to expose a sensitive plate of a slow emulsion for half a second with full aperture of the lens without seriously "fogging" it.

The camera was pointed toward that particular point of the heavens whence a flash was expected, the dark slide drawn, and, the moment a flash appeared visible in the field of view, the shutter was opened by the observer and held open possibly for a quarter of a second or longer. Four plates were thus successively exposed, three without results, but on the fourth trial a flash was obtained.

The image secured was sharp and distinct, but the remainder of the plate was of such density that it would be exceedingly difficult to reproduce the flash satisfactorily by means of the half-tone process.

The negative shows four distinct flashes, while a fifth is faintly visible. These, no doubt, are only a portion of the whole number of separate and successive discharges included in the complete act. The total duration of the successive discharges, as estimated by the unaided vision, was not far from two-fifths of a second.

The most striking feature of the flash is the width of the path of discharge. A comparison of the size of the image with that of the Washington Monument in the same field of view, and whose dimensions are known, enables us to determine with a fair measure of accuracy the angular width of the flash. The only uncertainty as to its linear dimensions arises from the fact that the distance of the flash from the camera is not known. If it occurred at the same distance as the Monument, the width of the bottom portion of the path of discharge would be about 20 feet. It is believed, however, that the flash was at some distance beyond the plane of the Monument, and that the width given above is too small.

NOTES BY THE EDITOR.

THE GREAT STORM OF OCTOBER, 1896, IN THE GULF OF CALIFORNIA.

About midnight of September 30 a hurricane wind began at La Paz, at the lower end of the Peninsula of California, and continued until 5 p. m. of October 1. This storm totally destroyed the city, and did much damage to the shipping. Reports from Guaymas, Mexico, state that the hurricane moved slowly northward during four days, September 30 to

October 3, prostrating telegraph lines, and doing great damage to property and shipping.

At Topolobampo all buildings were greatly damaged. The Ahomy River overflowed its banks.

The State of Sinaloa lost the entire sugar-cane crop, and so also the State of Sonora.

The town of Culiacan, the capital of Sinaloa, on the interior plateau, experienced a cloudburst, and was greatly injured. The tremendous rain on the ridge of high mountains back of the city filled the canyons and descended thence to the plateau with a fierceness never before known in that part of Mexico.

At Mazatlan many residences were damaged.

At La Paz the storm and tide combined to raise the waters in the bay to an unprecedented height, flooding the lower part of the city.

The steamer *Progreso* met the storm in the open ocean. She left San Francisco for Panama on September 24. Her course was a little farther off shore than that followed by the Pacific mail boats, and she was in rather light trim, therefore set rather high out of water. On the fifth day out, after strange barometric changes and a gale of wind, the hurricane burst upon the steamer from the southeast, but veered rapidly to the northwest. As the waves were growing higher and higher, and although there was but little daylight under the storm cloud yet a monster wave could be made out coming toward the vessel. Fortunately the *Progreso* was then headed bow on, and the wave passed clear over the bridge and the tops of the mid-ship houses, and over the whole length of the vessel, leaving a complete wreck of the deck, but without otherwise injuring the vessel.

The map of September 30 shows that on that date two well defined areas of low pressure existed; one on the Pacific coast of Mexico, and the other in the West Indian Region. As has been frequently stated in the WEATHER REVIEW, in our chapters on Atlantic meteorology, the equatorial belt of low pressure has a well-marked branch extending northward into the Gulf of California, and the general boundary of the equatorial trough is subject to very decided fluctuations both in the Atlantic and Pacific oceans. Special areas of low pressure with attending cyclonic winds become isolated from the equatorial trough, and move northward as hurricanes. These undoubtedly originate in a favorable combination of inflowing winds and the formation of areas of extended cloud and rain. The process is entirely similar to that which occurs in more northerly latitudes, when, as we have often pointed out, an elongated meiobar becomes converted into one or more well-defined whirls and storm centers. The track of the so-called La Paz hurricane can not yet be defined with sufficient accuracy to justify inserting it on Chart I, but it undoubtedly moved north or north-northeast into the Gulf of California, and broke up in that region on the 3d or 4th of October, while the West Indian hurricane (low area No. 1), moved from the neighborhood of Cuba north-northeast toward Hatteras. Pressure was lowest at Yuma on the 3d, and a trough of depression extended from that region northward into Alberta. A small number of hurricane tracks, ending on the Pacific coast of Mexico and California, were plotted by Redfield and others many years ago, and but little definite knowledge concerning them has been added since then. The Editor hopes soon to be able to publish a report from Weather Bureau officials at San Francisco giving a full account and track of the La Paz hurricane.

TIME RECKONING.

Some efforts that have been made to deduce very accurate results from the reports of the voluntary observers have impressed the Editor with the necessity of urging upon all observers the importance of paying close attention to the whole question of accurate time. Thus, one observer in filling up the statement of "time used on this report,' replies "ten minutes," whereas that statement is intended to call for the standard of time used by him in timing his observations and not for the quantity of time occupied by him in making out his forms. In order to compare together intelligibly observations of thunderstorms, tornadoes, hail, and other phenomena, it is necessary that the records should be kept according to some one of the several standards used by the railroad and telegraph companies of this country; that is to say, the time used in the reports should be that proper to the seventy-fifth, the ninetieth, the one hundred and fifth, or the one hundred and twentieth meridian of longitude west of Greenwich, choosing by preference the meridian that is adopted by the railroad or telegraph station in the observer's neighborhood. There are, of course, many townships so far removed from railroad and telegraph lines that these standards of time are not easily obtained, and in such places there may be some excuse for using the time proper to the local meridian. Such usage is not desirable but, if allowed, the observer should state distinctly how he obtains this local time, and should write the words "local mean time" on every report that he makes, or else he should convert his observed times into some standard hour meridian time, and use that only on his forms. Out of four hundred reports of a recent event there were at least five good observations expressed in local mean time, although the form stated that they were made in standard time; there were about twenty that were stated to be in local time but that were really in standard time of the seventy-fifth meridian; there were about thirty that were expressed in standard time of the ninetieth meridian, although the report said standard time of the seventy-fifth meridian. By far the best rule for all voluntary observers is to adhere as closely as possible to the standard of time shown by the clock at the railroad station that they are accustomed to visit, no matter whether this is the time used by others in their locality or not. Use this only on the forms and reports of observations, and state distinctly whether it is central, eastern, mountain, or Pacific standard.

A number of observers have reported the times used by them as "sun time," but this means nothing definite, as all kinds of popular times are regulated by the sun. Some use a noonday mark or a sun-dial without correcting for the equation of time and are thus actually using what is properly called the "apparent solar time proper to their local meridian." Others use the sun-dial but apply the correction for the equation of time and thus keep their clocks regulated to the "mean solar time of the local meridian." Others use the standard noonday signals that are telegraphed from Washington all over the country, and thus keep their clocks regulated to the mean time that belongs to some one of the recognized standard meridians (sixtieth, seventy-fifth, ninetieth, one hundred and fifth, one hundred and twentieth, etc.) All these are true *sun* times, and observers who have been accustomed to enter the words "sun" time on their forms should explain more definitely what is meant and how they determine their sun time.

As regards the regular observers of the Weather Bureau it is only necessary to add that their official instructions require that all reports to the Central Office be made uniformly in the standard time of the seventy-fifth meridian.

In conformity with the usage of the Bureau the times mentioned in the WEATHER REVIEW will be those of the seventy-fifth meridian, namely, the official standard at Washington, unless specifically stated to the contrary.

EARTHQUAKE AT SEA.

Captain Myer, of the ship *John C. Potter*, arrived at San Francisco, about October 26 and reports: "October 24, N.